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SIERRA NEVADA CORPORATION'S GATEWAY ARCHITECTURE

**Abstract**

Sierra Nevada Corporation (SNC) developed an architecture concept and full-scale ground prototype of our lunar Gateway concept under NASA's Next Space Technologies for Exploration Partnerships-2 (NextSTEP-2) Appendix A Habitat Systems and NextSTEP-2 Appendix C Power and Propulsion Element Studies. SNC's Gateway provides critical technologies and capabilities for a human-tended, cislunar outpost for future lunar and deep space exploration. Our Gateway is assembled using Space Launch System or commercial launch vehicles and features three unique platforms: the Power and Propulsion Element (PPE), the Large Inflatable Fabric Environment (LIFE) habitat, and the Extended Logistics and Control Module (ELCM). The PPE is the brains and brawn of the Gateway, providing critical power, propulsion, communications, and control. Our PPE offers a large pressurized volume to immediately support a 10-day Orion mission. With a combination of pressurized and unpressurized cargo capability, along with high power and solar electric propulsion, our PPE also enables efficient delivery of logistics to the Gateway. The LIFE habitat is an inflatable soft goods structure with a rigid core, providing ample volume for all planned Gateway activities, including space for on-board experimentation, dedicated work stations for lunar landers and lunar surface operations, crew habitation outfitting, and long-term storage. Our single habitat provides over 300 cubic meters of volume and supports all habitat functions needed for 30-day crewed Gateway missions. The ELCM is a multi-purpose pressurized module that delivers a 30-day mission supply of logistics to the Gateway, and acts as a crew airlock for critical extravehicular activities (EVA). Based on our Dream Chaser Cargo Module, the ELCM features an internal bulkhead that divides the ELCM into independent sections that serve as an EVA equipment lock and an EVA crew lock. SNC's Gateway elements provide flexibility to allow for immediate crewed operations, include infrastructure and workstations to support Human Landing System operations, and are extensible for long-duration Mars-class missions.

SNC has completed development of a full-scale ground prototype that consists of our LIFE habitat and PPE. The LIFE habitat features a soft goods restraint layer made of flight materials to demonstrate habitat inflation and pressurized operations. The interior of the LIFE habitat consists of two fully functional floors that are outfitted with robotic workstations, life support systems, crew quarters, exercise equipment, galley, payloads and cargo, permitting SNC and NASA day-in-the-life testing. SNC's ground prototype features an additional port that supports expansion of the full scale testbed.

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